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The Bristol Medico-Chirurgical Journal

"Scire est nescire, nisi id me
Scire alius sciret."

SUMMER, 1940.

CEREBRO-SPINAL MENINGITIS IN BRISTOL.

BY

B. A. PETERS, M.D., D.P.H.,

Medical Superintendent, Ham Green Hospital, Bristol.

SINCE the beginning of January, 1940, forty-two cases of bacteriologically proven cases of meningococcal meningitis have been admitted to Ham Green Hospital.

The age incidence was relatively highest under 5, as twelve cases fell in this group; ten in the 5-10 age-group; eleven between 10 and 20; and only nine over 20. The outbreak, compared with the last large outbreak in 1915, appears to be about the same severity, as twenty cases were very acutely ill, with delirium, restlessness and loss of consciousness; nineteen were moderately ill, with severe headache but no loss of consciousness; and three showed comparatively mild symptoms. A very unusual feature of these cases was the complete absence of pyrexia in sixteen of them, irrespective of the severity of the attack.

Exactly half of the cases had rashes of a purpuric nature. In the majority the purpuric spots were only 1 to 2 mm. in diameter, but four cases showed large purpuric blotches, in one case 10 cm. in diameter. As regards the distribution of the rash, it was most marked on the back, but was generally present on the limbs and,

in a few cases, spots were present on the face. Five others showed small macular pink rashes, very strongly resembling the rash of rubella; in fact, two of the cases were admitted with this diagnosis. Four had marked facial herpes, and the remainder no rash whatever.

A greater or lesser degree of neck rigidity was present in every case, and Kernig's sign could also be elicited in every case. Signs of cranial nerve involvement were observed in two cases only: one had a temporary left ptosis and another case a temporary diplopia. Two other cases showed non-suppurative arthritis involving the ankle-joints. The remainder were completely free from any complications, and made perfect recoveries with no residual damage up to the time of discharge, which was generally four to six weeks from the onset.

One unusual case occurred in an adult, not included in the above series. From the culture of the cerebro-spinal fluid a few meningococci and a large number of pneumococci, Type III, were grown. This case ended fatally.

The cases were all treated with sulphapyridine in the following doses: for adults one gramme was given two-hourly for three doses, then four-hourly up to the end of the fourth day, when half the dose was continued for two further days. For younger patients the dose was calculated on the following basis, as children seem more tolerant of the drug than adults: children were given the proportion of the above doses based on their weight relative to eight stone; that is to say that a child of four stone was given half this dose. With these doses and for the period stated no marked effect was found on the leucocyte count.

In many cases vomiting due to the increased intracranial pressure was a very troublesome symptom. For these the soluble sodium salt was given intramuscularly in the same doses until the vomiting ceased, when it was continued by mouth. It is very important to give this drug intramuscularly, in which site it appears to produce very little inconvenience. If given subcutaneously, it causes a localized necrosis of the tissues and a punched-out ulcer which is very slow in healing. This is apparently due to the high alkalinity of the preparation. It is rather remarkable how tolerant the muscles seem of this drug, as no patient has complained of any pain or stiffness when getting about again, although some of them had had as many as eighteen doses spread over three days in various parts of their vastus externus muscles.

In only two extremely toxic cases was meningococcal serum given intravenously, possibly with benefit. The serum we used (P.D. & Co.), is supposed to be antitoxic as well as bactericidal.

The results of treatment were strikingly beneficial in most cases, as, excluding the mixed pneumococcal case, only five fatalities occurred. Two of these cases were children who were moribund on

admission and only survived a few hours. One had been ill for three days and one was a fulminating case which only survived six hours from the observed onset of the symptoms. In this case there was a profuse purpuric rash ; the child was comatose and collapsed when admitted three hours from the onset of symptoms, and made no response to any treatment whatever. It was of interest that this case showed hardly any changes in the cerebro-spinal fluid. There was obviously an overwhelming meningococcal septicæmia.

Another fatal case was a chronic case which had been overlooked, probably of six weeks duration, in a young child with symptoms of hydrocephalus. In only two fatal cases could recovery have been expected. One patient was an infant of eighteen months, who was admitted on the third day, did not respond in the least to treatment, and died three days after admission ; the other was a youth of 19, admitted on the sixth day when signs of hydrocephalus were present, and he died within forty-eight hours.

In cases of severe vomiting death from collapse due to dehydration is a serious danger. This is best overcome with subcutaneous injections of 5 per cent. glucose solution in half-normal saline, in amounts from half to one pint, followed up with rectal saline.

Unlike one's experience in the 1915 epidemic, relapses were conspicuous by their complete absence. One case convalescent from this disease was admitted from another Institution with a diagnosis of diptheria. This case proved to be one of agranulocytic angina, and an examination of this patient's blood showed an almost complete absence of neutrophile leucocytes. The case terminated fatally forth-eight hours after admission. On inquiry it was found that the man, aged 28, had been treated for fourteen days with large doses of sulphopyridine.

Lumbar puncture was only done for diagnostic purposes, as we did not find it of any value in treatment in these cases. Our experience this winter suggests the vital importance of the early and intensive treatment with sulphapyridine if the presence of meningococcal meningitis is suspected. The improvement under the drug is almost incredible to one who has had experience of our former ineffective treatment. Improvement was evident within twenty-four hours of starting the treatment—the intense headache was usually gone within forty-eight hours, and in the comatose cases the restoration of consciousness occurred within the same period. In all the recovered cases the patient was over the disease, free of headache, and perfectly comfortable by the end of four days.

Our mortality rate in this series is 12 per cent. at the moment, compared with 47 per cent. in the last epidemic. The painful chronic cases we used to see, which sometimes dragged on for

some weeks or even months, were completely absent in this series.

The examination of the cerebro-spinal fluid was done by the staff of the Preventive Medicine Department of the University of Bristol, but typing of the organisms has not been carried out.

TRAUMATIC EXTRADURAL HÆMORRHAGE.

PART I.*

BY

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AND

MARJORIE DUNSTER, M.B., CH.B.

As a general rule common diseases and accidents have been recognized and described for many years, and rarer conditions have been much more recently brought under the notice of the profession. To this rule there are some curious exceptions, and one of these concerns traumatic extradural hæmorrhage. Text-books of surgery fifty years old describe the well-known clinical picture: a brief period of concussion, perhaps only momentary, the lucid interval lasting a few minutes or hours, followed by renewed unconsciousness, with deepening signs of cerebral compression such as stertorous breathing, slow full hard pulse, fixed dilated pupils, hemiplegia, and so on. The trouble is due, of course, to a rupture of the middle meningeal artery, and the syndrome is important because timely operation may save the patient's life. As a matter of general experience, however, this clinical picture is very seldom seen. Only once in nearly forty years has one of us (A. R. S.) met with a typical case that was correctly diagnosed and recovered after operation. Middle meningeal hæmorrhage is not very uncommon in the post-mortem room, but in such cases the lucid interval was usually absent and the diagnosis made was cerebral compression of unknown character.

It is the purpose of this communication to describe a case giving the typical history of extradural hæmorrhage in which the bleeding vessel was not the middle meningeal artery; and a further case in which the middle meningeal artery was the source of the bleeding, the diagnosis of intracranial hæmorrhage and of its location was correctly made in the absence of the text-book signs, and a method of location was used which proved to be more accurate than the neurological findings.

* Reprinted by kind permission from the *British Medical Journal*, June 1st, 1940, p. 884.

Case 1.—A young French lady, aged 23, on a visit to England, was involved in a motor-car smash at midnight. Her head was injured, but she was able to walk and talk, and went into a house. After a few minutes she became unconscious, and was admitted to hospital about an hour and a half after the accident. When seen at 2 a.m. she was deeply comatose, with widely dilated pupils which did not react to light, Cheyne-Stokes respiration, and a pulse of 100, not of full volume. The scalp was bruised over the vertex and parietal regions. The right arm and leg were slightly spastic, and the left arm and leg markedly so, with exaggerated knee-jerk and extensor plantar response. The rapid advance of symptoms made it evident that there was a spreading intracranial hæmorrhage.

At 3 a.m. an operation was performed with novocain local anæsthesia. A small burr-hole exploratory opening was made over the right parietal region ; nothing was found except a fissured fracture of the skull. A similar opening was made on the left side. There was extensive blood clot spread out between the dura and the vertex of the skull, derived from the superior longitudinal sinus. The fissured fracture crossed the vertex transversely. The clot was cleared out. The patient died on the table shortly after the end of the operation.

The special point of interest in this case is that there was a typical history of a lucid interval lasting a few minutes, followed by unmistakable signs of compression, but the hæmorrhage was derived from the superior longitudinal sinus and not from the middle meningeal artery.

Case 2.—A working man aged 42 was admitted to hospital, having been knocked off his bicycle the previous afternoon. He was in a very restless unconscious condition from the time of the accident until three days after admission. He then became quiet and sensible, but had no recollection of the accident. After four days he became more restless, and wandered mentally at times. This state persisted for a few days, then he became quiet, but did not regain a completely rational outlook, being rather garrulous.

On admission the central nervous system showed no abnormal signs. There was slight bleeding from the right ear, which cleared up next day. A radiograph revealed a fissured fracture of the right parietal bone. The pulse rate was 84. From the fourth to the seventh day the patient complained of slight headache. The further progress of the case is as follows.

8th Day.—Patient restless ; intolerable headache. Central nervous system : pupils were equal, and responded to light and accommodation ; no nystagmus ; knee-jerk slightly increased on left side ; plantar response on left equivocal ; tone normal. Pulse rate 60. Lumbar puncture : greatly increased pressure, roughly estimated at 600 mm. water ; fluid was yellow.

9th Day.—Patient complained of severe headache, and wandered mentally. Central nervous system as on eighth day. Lumbar puncture: pressure 600 mm. ; 60 c.cm. slowly withdrawn.

10th Day.—Patient quieter. Ankle-jerk and knee-jerk increased on left side ; plantar response on left side extensor ; tone equal. Lumbar puncture : pressure 350 mm. ; 60 c.cm. withdrawn.

11*th Day*.—Headache much relieved. Ankle-jerk and knee-jerk increased on left ; plantar response still extensor ; ankle clonus present ; tone slightly raised ; abdominal reflexes all present ; no anæsthesia ; no astereognosis ; no nystagmus ; pupils normal ; no facial weakness ; papilloedema pronounced. Lumbar puncture : pressure 100 mm. Patient continued with no change.

16*th Day*.—Electro-encephalogram taken. Mr. W. Grey Walter of the Burden Neurological Institute reported as follows : " Electro-encephalograms were taken at the Burden Neurological Institute on November 25, 1939. Records from the left side were entirely normal (Fig. A, p. 87). The superior part of the right hemisphere was also normal, but low down on the right side a prominent and well-defined delta focus was found (see Fig. B). The first few delta waves in the record shown are shaded to emphasize the phase relations of the waves, since it is upon these that the localization is based. Such a slow delta discharge indicates an abnormal area of cortex, but does not give information as to its cause. It is most common in cases of cerebral tumour (Walter, 1937), but comparatively few cases of head injury have been examined, though it is known that in recovered cases the record is normal. The findings in this case suggested that something equivalent to a cerebral neoplasm had arisen in the area shaded in the figure."

19*th Day*.—One of us (A. R. S.) operated for removal of extradural hæmatoma. An extradural blood clot about the size of the palm of the hand was found at the site indicated by the electro-encephalogram, over the lower Rolandic area. A small trephine-hole was made over the lower part of the Rolandic area and an extradural clot was seen. An osteoplastic flap with a radius of two and a half inches from the first trephine-hole was turned back. The clot was removed. A posterior branch of the middle meningeal artery was found to be bleeding. This was secured by suture and covered with Horsley's wax. The flap was replaced and the scalp sutured.

After operation a blood transfusion of two pints was given. The patient progressed favourably, and was discharged after four weeks, his mental condition being normal. The central nervous system was normal except for a slight increase in the knee-jerk on the left side.

DISCUSSION.

This case history presents a number of points of special interest. In the first place, the clinical picture was quite unlike the text-book description of extradural hæmorrhage. There was no lucid interval, and the signs of pressure were psychical rather than physical. The diagnosis was not made until the third week after the injury. In the second place, the neurological signs gave a false location and the electro-encephalogram a true one. Thirdly, the value of a late decompression operation was demonstrated. No doubt the patient was fortunate in that the bleeding ceased before the pressure was raised so high as to be fatal. The evidences of raised pressure were : (*a*) the mental symptoms ; (*b*) the exaggerated knee-jerk and extensor plantar response on the left side ; (*c*) papilloedema ; (*d*) the

high pressure of the cerebrospinal fluid. The fact that the fluid was lemon-coloured suggested that the amount of blood that had reached it was inconsiderable, which pointed to extradural rather than to intradural hæmorrhage.

Although the condition is not often recognized, at any rate by the majority of surgeons, there are good reasons for considering that persistent rise of intracranial pressure as a result of extradural or intradural bleeding is not very uncommon. In his classical monograph in Choyce's *System of Surgery* the late Wilfred Trotter has a section on the subject of latent subdural hæmorrhage, in which he says that these cases may run a course of several weeks or even two or three months. There is a long prodromal period in which the symptoms are "slight, ambiguous, or misleading, and a short period during which serious symptoms rapidly develop and the presence of a definite wide-spread compression becomes manifest. The accident may be severe, slight, or even apparently trivial." The symptoms during the prodromal period are headache and giddiness in many cases, but mental changes are the commonest. "Changes of disposition, attacks of irritability, lethargy, and loss of initiative are amongst the slight manifestations. There may also be transient attacks of mental confusion or of unconsciousness, possibly so slight as not to arouse serious attention. Persistent drowsiness, with perhaps mild delirium at night, occurs in some cases. It is unusual for definite physical signs of compression to be present, but such may come and go in a very surprising and puzzling way. At one examination an alteration of reflexes of hemiplegic type may be found, while the next day no such abnormality can be discovered. Often a fullness of the retinal veins on one side may be found, and as a rarity definite optic neuritis."

At the end of the prodromal period the headache may suddenly increase, vomiting occur, the drowsiness deepen to coma, and hemiplegia develop. The hæmorrhage is usually to be found over the lateral part of the cerebral hemisphere.

Wilfred Trotter does not describe similar symptoms due to extradural hæmorrhage as in the present case.

The Literature.

A number of papers have appeared in recent American surgical literature dealing with chronic subdural hæmatoma. The most interesting of these is by two Boston neurosurgeons, G. Horrax and J. L. Poppen (1937), who report as many as eighteen cases seen within the space of two years. In some of these the history of injury was trivial and the patient was sent up with a suggested diagnosis of cerebral tumour, arteriosclerosis of the vessels of the brain, or "post-encephalitic state." The symptoms were headache, mental changes, or lapses into drowsiness or coma. These surgeons made the diagnosis by means of exploratory burr-holes over the

posterior parieto-occipital regions on both sides, about 4 cm. from the middle line. If a subdural hæmatoma is present it shows blue-black through the dura. The usual situation of these hæmatomata is over the upper parietal region of the brain. They are as a rule sufficiently fluid to be washed out by means of a catheter. A perfect functional result is generally obtained. These authors do not refer to any cases of chronic extradural hæmatoma, but it is evident that the symptoms may be very similar. If in our second case the burr-hole exploration had been made in the situation advocated by Horrax and Poppen the haematoma would have been missed.

In this country Professor Lambert Rogers (1937), like the American writers, has laid stress on the importance and frequency of chronic symptoms, due to intracranial hæmorrhage following a head injury. In four cases described by him the operation was performed three days, five days, twenty-two days and three months, respectively, after the accident. In the first and second cases the hæmorrhage was extradural and derived from the middle meningeal artery; in the third and fourth it was subdural. In the first case the indication for operation was the development of hemiplegia in a patient who had never recovered from unconsciousness with cerebral irritation. In the second case the patient did not lose consciousness until the fifth day, but complained of headache. The third case had headache for a fortnight and then became drowsy and hemiplegic. The fourth case was suspected of a frontal cortical tumour.

LOCATION BY ELECTRO-ENCEPHALOGRAPHY.

Of perhaps even greater interest than the occurrence of latent extradural hæmorrhage is the method of location by means of electro-encephalograms. The necessary apparatus has recently been made available in Bristol at the Burden Neurological Clinic under the direction of Professor Golla. The great advantage of the method is its relative simplicity and harmlessness—quite unlike ventriculography and encephalography, which are not simple, nor free from all risk of unpleasant consequences. It remains for the future to show how accurate location by this method will prove to be. In the case under consideration the only evidence as to the site of the hæmorrhage was given by the fissured fracture of the skull and by the neurological findings—that is to say, the exaggerated knee-jerk and extensor response on the left side. This might have led us to trephine over the leg area. If this had been done the clot would have been completely missed. The fracture, on the other hand, was near the actual lesion. Trephining over the silent area indicated by the electro-encephalogram brought us down upon the very centre of the extradural hæmorrhage. It is very clear from these records and observations that when persistent headache or mental changes follow a head injury and do not resolve for days or weeks the

possibility of an extradural or subdural hæmatoma should be carefully considered and steps be taken to investigate the matter. In particular lumbar puncture and electro-encephalography would appear to be indicated. If information can be obtained in no other way exploration by burr-holes after the method of Horrax and Poppen might be justified. Missed cases will probably suffer from persistent headache and mental symptoms, or there may be a late oncoming of monoplegia or hemiplegia. Cases correctly diagnosed can be relieved of all their symptoms by operation.

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PART II.

THE CLINICAL APPLICATION OF ELECTRO-ENCEPHALOGRAPHY.

BY

W. GREY WALTER, M.A.
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IN a recent article in this *Journal** an account was given of the historical development and present practical utility of electro-encephalography. Attention was confined to the general clinical aspects of the new science since the technical details are difficult to expound without reference to particular cases and actual records obtained with the apparatus. However, in Case II, recorded above, location of the lesion by electro-encephalography proved more accurate than the conventional clinical methods, and led to a successful operation. It was thought that this case, being of local as well as surgical interest, might provide a nucleus for a description of the means whereby such location is achieved.

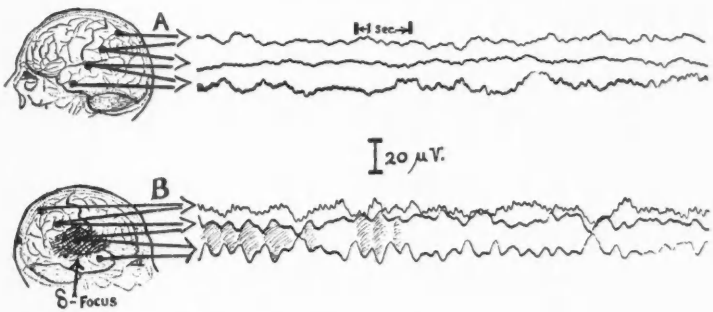
Like electro-cardiography, electro-encephalography involves registration of the minute electrical currents produced by active living cells. Examination of these " bio-electric " phenomena gives us the best " inside information " about the course of living processes which we can obtain at present, but there are many technical difficulties. The first is the small size of the currents. They bear the same sort of relation to those used, say, in an electric flashlight

* Walter, W. Grey, *Bristol Med. Chir. Jour.*, 1939, lvii. 215.

as the size of a red blood cell does to that of the human body. They must be enormously magnified or " amplified " before they can be seen or recorded. The second, more abstruse, difficulty is that the existence of an electric current depends upon a difference of electrical pressure between two places, and what the modern electrical instruments measure is that *difference of pressure* or electrical " potential." This is not an absolute sort of measurement : the potential of one point is measured with respect to another and this means that, when a potential difference is discovered, no single measurement can determine whether it is due to a rise of potential at one of the points or a fall at the other.

In the case of the heart this ambiguity is of no great practical importance since it is known that the electro-cardiogram is due to the potentials from the heart muscle and the location of the heart is already known ; moreover, the potential pattern in the familiar P Q R S T waves is regularly repeated so that leads can be taken successively from the conventional three or four positions without fear that the form of the waves has altered while the connections were being changed.

But in the brain we have an enormously complex organ, any part of which may produce a series of electrical waves, and these waves are never the same for long in size or shape. If we merely place one lead on one side of the head and one on the other and pick up a fluctuating electrical potential between the two we shall still not know which of the leads or electrodes is nearer to the part of the brain generating the potentials. If we attempt to check this by moving the electrodes to another position we cannot be certain that the region of activity has not also shifted meanwhile. The only way to get around this difficulty is to take records from several points simultaneously so that each individual wave may be tracked down and located. That is why in the records in the Figure three wavy lines are seen. Each line represents the momentary fluctuations



Electro-encephalogram of Case II, showing silent area over the haematoma.

of potential between two electrodes represented on the head diagram as black dots. The recorders are so connected that, when two adjacent lines are seen to approach or recede from one another, the region of activity may be inferred to be near the electrode common to both : when the lines rise and fall together the focus of activity is towards one end or the other of the electrode chain. When the record shows waves rising and falling in opposition to one another the waves are said to be " out of phase " ; they are " in phase " when they rise and fall together.

Now in Figure A, although there is a certain amount of irregularity in the record, there is very little in the way of rhythmic activity. This record is normal for a person in the alert state. Towards the end of the Record A, the bottom line shows small ripples ; these are the so-called " Alpha " waves found in the parieto-occipital region in normal subjects, and indicating a state of relative physiological rest in this area. At this point it would be well to emphasize that, in the brain, rhythmic *electrical* activity is seen chiefly when there is a *decrease* in functional activity. This is believed to be due to the fact that when the brain is performing some normal function, comparatively few of the neurones are doing the same thing ; when the nerve cells are released from activity they " mark time " together and the sum of their activities is large enough to be detectable on the outside of the head. Moreover, when some pathological process prevents their functioning they will again tend to fall into step, but at a slower rate, a sort of funeral march. These slow pathognomonic waves are called " Delta waves." They are clearly seen in Figure B. In order to bring out the phase relations of these waves in the middle and bottom lines, the space between the first few has been shaded. They are " out of phase " and are therefore coming from the region under the electrode common to the two recorders responsible for the lines showing them. The speed at which the records were taken is shown by the seconds interval in A. The delta waves have a frequency of about three per second. The degree of amplification is shown by the bar between the records : a vertical deflection of the lines of 9 mm. in the original records signifies a change of potential of twenty-millionths of a volt between the electrodes to which the recorder concerned is attached. The delta waves in B have a size from crest to trough of about ten-millionths of a volt.

These minute delta waves then indicate that the area shaded in the brain diagram is in an abnormal condition. There are also normal alpha waves in the top line of B, and these mean that the regions above and behind the shaded part are normal. Many other records were taken from this patient and they all confirmed that the abnormality was limited to the lower central part of the right hemisphere. The only neurological localizing signs in this case were an exaggerated knee-jerk and extensor plantar reflex on the left

side. As Professor Short points out, if these guides had been followed, the trephine would have been made much too high and the clot would have been missed, for its centre was actually where the centre of the delta focus had been indicated.

It may be asked : " Is it possible to infer from the record what the nature of the disturbance may be ? " This is difficult to answer. In the previous article on clinical electro-encephalography it was stated that a delta discharge is found in two main pathological groups—expanding lesions and idiopathic epilepsies. Distinction between these two groups can be made in two ways—apart of course from the clinical history, signs and symptoms. Firstly, the site of the discharge in epileptics is most commonly in either the prefrontal or the occipital regions—it is only rarely in the central parts. Secondly, the form of the delta waves in epileptics is more regular than in the other group ; the rhythm is more regular, and there are often, particularly in *petit mal*, absolutely diagnostic complex wave forms. Within the group of space-occupying lesions differential diagnosis is not always possible. In general, the lower the delta frequency, the more acute or malignant the pathological process : also, the greater the size of the waves, the larger the area affected. Occasionally, as a *tour de force* a complete diagnosis has been made by electro-encephalography alone, the site, depth, size and nature of a tumour being foretold. But these attempts have not been uniformly successful. In the tumour group, for example, a slowly growing meningioma in certain sites may give rise to a very slow discharge indistinguishable from that associated with a highly malignant glioblastoma. This is presumably because the solid mass of a meningioma may interfere very seriously with the circulation of blood and cerebro-spinal fluid, thus reducing the nervous elements to a state of extreme dystrophy, while the other benign group of tumours, the astrocytomata, may scarcely interfere at all with the nutrition of the neurones. It is this latter group of tumours which produce the least degree of electro-encephalographic abnormality, and when a tumour has been missed it has nearly always turned out to be an astrocytoma. Therefore, if there are quite unmistakable clinical signs of new growth but the electro-encephalogram is normal or nearly so, the prognosis is good. That an abnormal electro-encephalogram does not always carry a bad outlook is illustrated perfectly by Professor Short's case ; there was nothing in the record to distinguish it from one taken from a case of malignant tumour, but the operation was entirely successful and the relief should be permanent. The apparent ambiguity of the record is explained by the *acuteness* of the lesion. The records were taken only a week after the onset of severe headache and the appearance of serious clinical signs. If there had been no intervention and the patient had survived for a few weeks, it is probable that the electro-encephalogram would gradually have returned to " normal " as the

affected cells progressively perished entirely and ceased electrical activity.

This case, then, illustrates three points: firstly, the accuracy of electro-encephalographic location; secondly, the importance of early examination before the nervous tissue has been completely destroyed, and, thirdly, the purely complementary nature of the examination, which can reach its full utility only when correlated with careful clinical observation.

HEAD INJURIES IN WARTIME

BY

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REGARDING the incidence of head injuries in modern warfare, it is obvious that figures taken from the records of the Great War cannot be applied to present conditions. It is perhaps reasonable to assume that in air bombing some 10 out of every 100 injuries will be head injuries. Of these maybe three will be severe untreatable cases ; four, closed injuries (with no open wound), and three will have open wounds of the skull, scalp and brain. It will be noticed that the incidence of closed injuries is placed higher than open injuries ; this may be surprising, but is probably true and will be alluded to later. Thus a large raid with say 5,000 casualties will provide 350 head injuries requiring treatment. The purpose of this article is to describe the form these injuries may take.

CLASSIFICATION.

Head injuries may be grouped into major categories as follows :—

A. Open wounds of the head.
   1. Scalp wounds pure and simple.
   2. Scalp wounds with symptoms of intracranial lesions.
   3. Open fractures of the skull.

B. Closed head injuries.
   1. Simple concussion cases.
   2. Cerebral irritation cases.
   3. Intracranial hæmorrhage cases.

C. Late " problem " cases.

It is not claimed that this is an exhaustive list or even a very scientific method of classifying such cases. But it supplies a rough and ready means of grouping cases in the hospital admission department.

It is clear that many patients will have multiple injuries: in some cases the head injury being the major feature, in others the head injury being mild and the other injuries dominating. The groups listed above will now be considered in more detail.

A. OPEN WOUNDS OF THE HEAD.

1. *Simple Scalp Wounds.*

Providing there has been no loss of consciousness, these cases will not ordinarily require detention. Momentary stunning will probably not be considered as loss of consciousness sufficient to warrant detention in view of heavy pressure upon available beds. The larger first-aid posts and the minor surgical teams will deal with these cases by excision and suture. Free hair cutting and wide shaving is essential. Three special features may be mentioned, namely: severe hæmorrhage, difficulties in closure, and major loss of scalp-tissue. If no fracture exists hæmorrhage may be temporarily controlled by a scalp tourniquet and by under-running sutures. Permanent control is secured by accurate re-suturing in two layers, Difficulty in approximation can be overcome by either an S-shaped or tripod extension of the wound; hence the importance of the preliminary wide shaving. Extensive loss of scalp substance must cause difficulty. Such wounds after debridement are best treated by immediate Thiersch grafts, which, when bandaged on firmly, take extremely well. Local anæsthesia will suffice for all cases in this class. Dressings are difficult to apply and uncomfortable to wear in these cases. The wounds should be painted with mastisol or Whitehead's varnish and then left to dry, except skin-graft cases, where the special dressing of tulle-gras, etc., should be used.

2. *Scalp Wounds with Symptoms of Intracranial Lesions.*

This is a common type of civil injury and it is also likely to be common in warfare. In the majority of cases the intracranial symptoms will take precedence and once the scalp wound has been dealt with, this group will then fall into the category of closed head injury (p. 94). Any severe head injury causes a good deal of collapse, which may last some hours. During this period it is most inadvisable to deal with wounds even though contamination is present (all "raid" cases may be considered to be contaminated). A nice dilemma arises between the natural desire to excise contaminated tissue at the earliest possible moment and the need to leave shocked cases alone. Local anæsthesia makes it possible to excise at an earlier moment than would otherwise be possible Some American surgeons press the policy of delay, and say it does not lead to infection if the wounds, once covered, are then left undisturbed.

The problem will arise in the cases in this group and the next.

3. *Open Skull Fractures.**

These will be present in four groups :—

(*a*) Head injuries with scalp wounds where exploration shows a fissured fracture lying in the depths of the wound.

(*b*) Head injuries where a compound fracture is immediately obvious but the dura mater is apparently intact.

(*c*) Gross compound fractures with protusion of brain substance.

(*d*) Fractures of the base of the skull which have to be catalogued as open fractures (except the rare posterior fossa fracture).

A fracture of the skull is of paramount importance when it is :—

Compound : Leading to infection of the brain and meninges.
Depressed : Compressing the brain.
A cause of lacerated blood vessels : leading to compression of the brain.
Associated with injury to cranial nerves.

Fracture of the skull may be of diagnostic significance, indicating the site of cerebral damage. Fracture of the skull may occasionally provide a spontaneous decompression. Apart from the above provisos a skull fracture is a matter of surgical insignificance, though frequently of legal importance.

It will be noted that from the foregoing that fracture is only important in so far as it causes cerebral damage.†

Certain features of the four categories listed will now be mentioned :—

(*a*) The routine treatment for the scalp wound is undertaken, with the necessary measures for the concomitant cerebral damage. No special treatment is necessary for the fracture unless obviously depressed, or unless focal symptoms or compression symptoms are present.

It is not denied that in some few of these cases there may be a separation or depression of the inner table of the skull only, but in the absence of symptoms immediate interference is undesirable. It is preferable to wait for detailed radiological studies, the electro-encephalogram and other special tests.

(*b*) The group of head injuries where a compound fracture is immediately obvious, but the dura mater is apparently intact,

* It is at present recommended to give sulpha-pyridine to all open head injury cases *before* the occurrence of symptoms suggestive of infection. As soon as the patient can swallow, tablets of M. and B. 693 are given. Its benefit in certain cases is undoubted.

† It was said of these fractures at the time when the "Bohler treatment" of general fractures received world publicity, that skull fractures should be treated by a Bowler hat. This witty remark, I believe, is attributed correctly to Sir William De Courcy Wheeler. It is appropriate, in that emphasis is placed on the wisdom of "no interference."

frequently provides gratifying results. The force of the blow appears to have expended itself in damage to the brain-case, while the precious contents may sometimes be singularly little damaged. The principles of wound excision are meticulously applied, the scalp edges being first excised and then the bone edges trimmed away. Comminuted fragments are removed, and it is of no moment if wide skull defects are left. Bleeding is arrested and the dura mater inspected.

Should the dura mater be opened? There are definite indications, one definite contra-indication and some doubtful cases. The indications are neurological symptoms of focal cerebral damage, general symptoms of compression—stupor (many patients in this class will be conscious on admission)—or bluish coloration of the dura indicating sub-jacent hæmorrhage. The contra-indication is established infection in late cases.

At the inspection of the dura mater small unsuspected lacerations may be found; these are sutured if there is no tension.

(*c*) Gross Fractures.—These are not necessarily fatal, though the prognosis is certainly much worse. Perhaps 50 per cent. may be saved, though not all of these will return as economic members of society. After excision of the scalp edges and free removal of bone, pulped brain tissue should be gently removed by irrigation and suction. The dural edges must not be excised nor retracted, as this is liable to open up the leptomeningeal spaces and to allow a local infection to become generalized. The wound-track in the brain must be gently explored and cleared of débris. Before closure the cortex will be protected by a sheet of amnio-plastin. Drainage of such wounds is a wise precaution.

(*d*) Fractures of the Base of the Skull.—Here the word "management" is preferable to "treatment" as indicating that there is not necessarily much to do but plenty of scope for careful supervision. The nasal passages and the external auditory meatus must not be plugged because of hæmorrhage or leakage of cerebrospinal fluid: nor should these passages be irrigated or syringed. The external meatus should be gently cleansed with cotton wool mops soaked in spirit by someone who can use a speculum. A wick of gauze in carbolic 1 in 80 may be left in the meatus and a sterile covering dressing applied. Treatment otherwise will be directed to the neurological state, and this is considered under the following sections.

B. CLOSED HEAD INJURIES.

The importance of making notes at the earliest opportunity should be emphasized. Notes made by first aid parties *at the time of observation* giving *date* and *time* as well as clinical facts are very

valuable. Particular attention should be paid to the state of consciousness, *i.e.* normal consciousness, conscious but confused, irritable, semi-conscious, some reflexes, unconscious, reflexes lost and deep coma. The cranial nerves can be quickly tested and the condition of the limbs, whether paralysed or normal, and the state of limb reflexes noted.

Intra-cranial hæmorrhage, which may be remediable, is usually diagnosed by observing a "march of events" in the clinical picture; it is the recorded changes which cause the surgeon to suspect a hæmorrhage: hence the importance of accurate note-taking.

Simple Concussion Cases.

These cases call for observation rather than treatment. The diagnosis is confirmed in retrospect rather than at the time of examination. It is not possible to be certain that an intracranial hæmorrhage has not occurred until the patient has remained well over a period of time which may have to be months. Of course, it is always possible to make a shrewd guess sooner and it is certain that the first forty-eight hours are the most critical.

On the other hand, experienced neuro-surgeons can recall cases apparently well and discharged from hospital who have been re-admitted on account of hæmatomata. The writer has a case in mind:—

M.C. (a sailor, age 23 years) had been two weeks in hospital for observation after "severe concussion"—he was apparently well and the attendants were not concerned about him. He was evacuated in the "Munich crisis," but re-admitted some fourteen days later in coma. I then saw him for the first time, diagnosed and operated on a huge subdural hæmatoma. Unfortunately, he never regained consciousness, and four days after operation he died. In my opinion cortical asphyxia had lasted too long before operation to permit recovery.

Most concussion cases make a rapid and complete recovery. If this does not occur, suspicion is aroused that the case is not one of concussion at all, and some other diagnosis must be sought for. The immediate treatment of concussion is rest and quiet.

Since most cases are almost well next day, three weeks in a darkened room is an intolerable imposition. While prolonged rest is advisable, convalescence must be judiciously managed: books, jigsaw puzzles and wireless allowed if the patient wants them: they may dispel boredom and introspection. Many patients will refuse to rest at all and may suffer no penalty for refusing advice which is clearly only dictated by caution. Perhaps "living dangerously" should not be discouraged at the present time!

A few will develop the post-concussional syndrome (headaches, inattention, anxiety feelings, minor forgetfulness, irritability) and require expert investigation (electro—and/or air—encephalography), or the aid of a psychologist.

The Cerebral Irritation Case.

This is a familiar and not uncommon clinical type. The patient lies curled up, resenting light, any examination, or nursing attention. He is not unconscious and can easily be aroused and sometimes irritated to frenzy. He may be restless, and then a search should be made for non-cerebral irritants. A common example is a full bladder. The bemused patient may keep trying to get out of bed to micturate while the nurse keeps pushing him back, until a fight may develop.

An external irritant will not always be found, but it should always be looked for. Complications in cases of cerebral irritation include intracranial hæmorrhage, bronchopneumonia, urinary infection and bedsores.

Should Dehydration Therapy be Employed?

A few years ago this was a popular routine: at the present time its *routine* use is condemned. For selected cases and for specific purposes (*e.g.* cases of general cerebral oedema, to relieve coma for pre-operative diagnosis, to relieve tension temporarily until decompression is possible) it is definitely valuable. Dehydration methods may be classified as slow and rapid. Standard *slow* methods are: magnesium sulphate in large doses by mouth or 6 to 10 oz. of common salt 20 per cent. solution per rectum, six hourly or p.r.n. If persisted with, symptoms of proctitis may supervene, and the treatment must be stopped.

Rapid dehydration is obtained by either intravenous injections, 30 per cent. sucrose in doses of 50 to 200 c.cm, or by lumbar puncture. Diagnostic lumbar puncture with manometry must precede and control rapid dehydration measures.

Dehydration cannot be beneficial and must be harmful if there is intracranial bleeding or damage to cerebral substance: dehydration cannot be harmful and will be beneficial if generalized cerebral oedema is the sole lesion that exists. Thus accurate diagnosis must precede this treatment.

Most cases of cerebral irritation, if the major complications, as previously described, are avoided, will gradually improve and return to normal, or almost normal, in from three weeks to six months. Some cases, however, do not do so: the problem then is to decide whether operative measures should be employed. Exploration is justified if there is any likelihood of a localized hæmorrhage, or even if doubt exists in a case where normal improvement is not taking place. In a case where manometry confirms the diagnosis of persistent oedema suggested by headache, irritability, papilloedema, and where control by dehydration is difficult, then a right-sided subtemporal decompression is justified.

Intracranial Hæmorrhage Cases.

These form the dramatic cases in head injury work. They are comparable to the ruptured spleens and ruptured ectopic gestations of general surgery, in that prompt and fearless diagnosis is necessary together with effective operative intervention. The comparison holds further in that it is probably safer (in good hands) to operate unnecessarily than to fail to operate in doubtful cases.

Intracranial hæmorrhage may be :—

1. Extra-dural.
2. Sub-dural : Diffuse, when it is also sub-arachnoid ; Localized.
3. Intracerebral : Small, leading to cyst formation ; Large, generally fatal.

Extra-dural hæmorrhage may occur from the middle meningeal vessels or from the superior longitudinal sinus or from the lateral sinuses.

Sub-dural hæmorrhage of the local variety may appear in an acute or chronic form, *i.e.*, symptoms may appear within a few days of the accident, or not until months or years after the accident, when a cerebral tumour may be simulated.

Hæmorrhage in the cranial cavity is usually of a progressive nature, and the diagnosis of its presence and situation is more important than the diagnosis of its type, whether extra or sub-dural. The early symptoms are irritative and thus difficult to distinguish from cases in Group B.2. Suspicion of intracranial bleeding is aroused by noting :—

1. Progressive symptoms.
2. Occurrence of convulsions.
3. Onset of paralysis.
4. Persisting unconsciousness.
5. Pupillary changes.
6. Persistent vomiting.

The site of the hæmorrhage is suggested by the presence of scalp bruising or skull fracture (this may be misleading), or by focal symptoms and mode of onset of the paralysis or other symptoms.

Success in diagnosis and subsequent treatment is often due simply to the awareness on the part of the medical attendant of the possibility of hæmorrhage. Too often in the past have cases of this nature been allowed to lie in bed to all intents and purposes unexamined, and left to live or die as nature wills. Knowledge of the pathological processes at work will often enable the surgeon to turn the scales in favour of recovery.

C. LATE OR PROBLEM CASES.

This is a wide category comprising such apparently unrelated cases as :—

1. Late epilepsy.
2. Cerebral abscess.
3. Retained foreign body.
4. Persistent headache.
5. Cerebral hernia.
6. Skull defects, etc.

It is impossible in this article to deal with the diagnostic and operative features of these cases. They will provide the neuro-surgeon with his " interesting cases " and tax his ingenuity and skill.

Points in First Aid.

1. Note-taking.—Brief, accurate notes from the first-aid posts are indispensable. So many head injury cases will be unable to tell their story that a brief note is invaluable. *E.g.* :—

(*a*) Hit by fallen roof tile, unconscious till arrival at Aid Post. Conscious but confused here. No paralysis noted.—X.Y.Z., Aid Post M.O., 4.0 p.m., 0/0/40.

(*b*) Brought in in irritable state. Jumped out of second floor escaping fire. Pupils equal and react. Corneal reflex brisk, ? paralysis left arm.—X.Y.Z., 1.0 a.m., 0/0/40.

2. Treatment.—Simply cover scalp wounds unless free hæmorrhage is still taking place. Treat bleeding cases by tourniquet if skull is intact, by suture if skull is fractured. **Do not** give morphia.

3. Transport.—Shocked and irritable cases must lie flat. Other cases may sit up.

Reviews of Books

Tuberculosis of Bone and Joint. By G. R. GIRDLESTONE, F.R.C.S. Pp. xii., 265. Illustrated. London: Oxford University Press (Humphrey Milford). 1940. Price 30s.—The author of this book has been very fortunate both in his training and in the opportunities which he has enjoyed. One of Robert Jones's most able and enthusiastic pupils and colleagues, he was associated with that great man during the stirring days of the Great War, and was one of the pioneers of modern orthopædic surgery in this country. During the past twenty years he has been enabled to replace this by a modern open-air school hospital, which has been ever in the van of orthopædic progress. The present volume represents the author's considered experience and opinion on all the problems associated with tuberculosis of the bones and joints. It is very clearly written and well illustrated. The chapters on the hip and spine give a very complete account of the pathology, treatment and prognosis of tuberculous disease of these structures. The book does not profess to give a complete account of various opinions and practices, but consists merely of a description of the author's own practice, with some indications of the results obtained. Many authorities will not agree with all his advice and conclusions, but the book will remain as a faithful exposition of the practice of a very earnest student of the subject. The chief point of criticism which will be levelled against Mr. Girdlestone is that whilst he preaches the doctrine of conservatism he advises the practice of operative interference under conditions which are open to considerable doubt.

An Introduction to Medical Genetics. By J. A. F. ROBERTS, M.B., D.Sc., F.R.S.E. Pp. xxiii., 266. Illustrated. London: Oxford University Press (Humphrey Milford). 1940. Price 15s.—To many people medical genetics is an unknown world vaguely associated with genes and higher mathematics. Actually the subject is intimately connected with ordinary clinical work and the contributions of geneticists during the last thirty years have thrown invaluable light on many obscure problems. Many questions that could only be answered with a well-intentioned guess can now be dealt with accurately. Dr. Fraser Roberts' book presents the whole subject in extremely readable form. It is probably too full for the already overworked medical student, but should prove invaluable for all those working for higher examinations. The book is excellently produced and is up to the high standard that is always attained by the Oxford University Press, and should stimulate many people to take a more intelligent interest in the whole subject of heredity.

Practical Food Inspection. Second Edition. By C. R. A. MARTIN, M.R.San.I. Vol. I.: pp. viii., 316, price 15s. Vol. II.: pp. viii., 275, price 12s. 6d. Illustrated. London: H. K. Lewis & Co. Ltd. 1940. —A second edition of these two volumes appearing so soon indicates the need for a work of this character. The author appears to have covered every possible aspect of the practice of food inspection and has presented his conclusions in an informative and easily readable manner. Legislation dealing with the practice is couched in simple and concise phrases. The new procedure under the Food and Drugs Act, 1938, brings it right up to date. The work is generously illustrated. The original sketches are excellently drawn and so clearly intelligible as to give a very good idea of the characteristics of the diseases found in food animals. Food inspectors generally have appreciated the first edition and regard them as text-books. The new edition therefore, being enlarged with the most recent information, will be welcomed by these and by the student preparing to qualify as a meat and food inspector. Medical Officers of Health and Veterinary Officers will find the extensive practical experience of the author a very useful aid. The index is full and complete, the general format excellent, and it can be fully recommended as a well-written practical exposition of food inspection. The great value of this work is that within its covers are contained all the essential principles of this comprehensive subject tersely and lucidly described.

A Text-Book of Psychiatry. Fifth Edition. By D. K. HENDERSON, M.D., F.R.F.P.S., F.R.C.P.E., and R. D. GILLESPIE, M.D., F.R.C.P., D.P.M. Pp. xii., 660. London: Oxford University Press (Humphrey Milford). 1940. Price 20s.—The fact that five editions of this work have been published since 1927 is evidence of its popularity. The present edition follows the general form of its predecessors, with the addition of chapters on play therapy and child guidance work and on modern shock treatment. The views expressed on both subjects are cautious but encouraging, and the whole book can be confidently recommended to all those who are interested in the subject.

Medical Annual, 1940. Edited by H. LETHEBY TIDY, D.M., F.R.C.P., and A. RENDLE SHORT, M.D., F.R.C.S. Pp. 604. With 62 figures and 65 plates. Bristol: John Wright & Sons Ltd. Price 20s.—Wright's *Medical Annual* for 1940 continues to offer an all-round survey of the progress of medicine in all its branches. The role of sulphonamides in therapeutics is discussed in various articles. In surgery the articles on war injuries in the light of Spanish war experiences will be read with particular interest. An article on the medical hazards of submarine crews has a particular freshness and importance. That widespread nuisance "Athlete's Foot" or interdigital ringworm of the toes is dealt with in a short and valuable contribution. Industrial medicine is given more attention than usual in this volume, but not more than it demands in these times of high pressure work in factories. It is hard to find anything new that goes unnoticed in our old friend the *Medical Annual*; but there is a great advantage in having novelties critically appraised by workers of experience, as they are in this compendium.

Editorial Note

The Middlesex Hospital.

For the first four months of the War the pre-Clinical Medical Students of the Middlesex Hospital worked in the University of Bristol. They and their teachers adapted themselves splendidly to the new environment and made themselves thoroughly popular guests. We are pleased to publish a letter which Professor Kirk has addressed to this *Journal*. These friendships, which the fortunes of war have opened up, go a long way to minimize the unpleasantnesses :—

"I wonder if you can find a little space in your *Journal* for this short message from the members of the Middlesex Hospital Medical School whose good fortune it was to sojourn in Bristol from September to December, 1939 ? A good many months have sped since, in obedience to the call of higher authority, we returned to our home at Mortimer Street, London, but the passing of time and the crowded experiences of subsequent events have not diminished one jot the happiness we have in recalling those days we spent as the guests of the good folk of Bristol. In particular we recall most gratefully the kind and gracious hospitality so many of us received in the homes of the members of the medical profession in your Western city.

"Those of us who had the responsibility of finding at such short notice billets for a family of 200 teaching staff and students felt a little staggered when we contemplated the difficulties which loomed ahead as our first reconnaissance party boarded the train at Paddington. Our fears were foolish and ill-founded. We had never been to Bristol, and we did not know its warm-hearted people. The understanding help and unfailing courtesy of everyone to whom we appealed for assistance in our time of need speedily dissolved our problems and difficulties.

"The ready response of many new-found friends who, undaunted by the inconveniences and readjustments inevitably involved, opened their homes to accommodate so many of our staff and students is something we shall never forget. When the honeymoon stage was over and our foibles and idiosyncrasies became all too apparent, the patient tolerance of our hosts and hostesses won our admiration.

"The readiness, too, with which the University Authorities and Teaching Staff accommodated us and made everything comfortable and pleasant for us in an academic sense, is also gratefully acknowledged. We think it can be claimed that the students of the Middlesex School not only lost nothing by their evacuation, but profited by some of the experiences through which they passed during their stay in Bristol. For example, many of them still talk of the 'Galenicals' and the

stimulus they received even in these pre-clinical days from several excellent meetings of that Medical Society. Our only regret is that our stay in your city came so abruptly to an end just when we were beginning to take root in our new environment.

"To all those friends who smoothed out our difficulties and so unselfishly supplied our needs we send our cordial greetings and grateful remembrance."

The Medical Library of the University of Bristol

WITH WHICH IS INCORPORATED

The Library of the Bristol Medico-Chirurgical Society.

The following donations have been received since the publication of the list in April, 1940.

	July, 1940.
American Otological Society (1)	1 volume.
Messrs. J. Baker & Son (2)	1 volume.
British Homœopathic Association (3)	1 volume.
British Medical Association (4)	5 volumes.
Brompton Hospital for Chest Diseases (5)	1 volume.
Buenos Aires University (6)	1 volume.
Campden Research Station (7)	1 volume.
Ciba Limited (8)	1 volume.
Dr. E. A. Codman, Boston, Mass. (9)	1 volume.
Professor E. W. Hey Groves (10)	7 volumes.
Dr. J. E. Shaw Bequest (11)	2 volumes.
Munro Smith Fund (12)	1 volume.
National Foundation for Infantile Paralysis (13) ..	1 volume.

Unbound periodicals have also been received from Professor E. W. Hey Groves, Professor C. Bruce Perry, Dr. G. de M. Rudolf, and Dr. J. Odery Symes.

THE ONE HUNDRED AND SEVENTY-FIRST LIST OF BOOKS

The figures in round brackets refer to the figures after the names of the donors. The books to which no such figures have been attached have either been bought from the Library Fund or received through the *Journal*.

Behan, R. J.	*Relation of Trauma to New Growths—Medico-Legal Aspect*		(10)	1939
Bertwistle, A. P.	*Descriptive Atlas of Radiographs*	4th Ed.	(10)	1939
Brain, W. R.	*Diseases of the Nervous System* ..	2nd Ed.		1940

Buxton, St. J. D. (Ed.)	*British Red Cross Society, Notebook for First Aid Courses* .. .. 2nd Ed.		1940
Catalogue of the Periodical	*Publications in the Libraries of the University of Bristol*		1940
Codman, E. A.	*The Shoulder*	(9)	1934
Cope, V. Z.	*Pioneers in Acute Abdominal Surgery*		1939
Couch, J. H.	*Surgery of the Hand*	(10)	1939
Davis, C. E.	*The Mineral Baths of Bath*		1883
De Brun, H. C. W. S.	*Manual of Fractures, Dislocations and Epiphyseal Separations*	(10)	1939
Devine, Sir H.	*Surgery of the Alimentary Tract* ..	(10)	1940
Festschrift zur 74 Versammlung deutscher Naturforscher	.. .. ..	(2)	1902
Filippi, J. de	*Dietetica Argentina para Bacilosos* ..	(6)	1935
Frazer, W. M., and Stallybrass, C. O.	*Textbook of Public Health* 10th Ed.		1940
Girdlestone, G. R. ..	*Tuberculosis of Bone and Joint*		1940
Groves, E. W. Hey, and Brickdale, J. F.	*Textbook for Nurses* 6th Ed.		1940
Gunn, J. A.	*An Introduction to Pharmacology and Therapeutics* .. .. 6th Ed.		1940
Henderson, D. K., and Gillespie, R. D.	*Textbook of Psychiatry* .. 5th Ed.		1940
Hirst, F., and Adam, W. B.	*Hydrogen Swells in Canned Fruit* ..	(7)	1937
Martin, C. R. A.	*Practical Food Inspection* .. 2nd Ed., 2 Vols.		1940
Miller, J. A., and Wallgren, A.	*Pulmonary Tuberculosis in Adults and Children*	(12)	1939
Roberts, J. A. F.	*An Introduction to Medical Genetics*		1940
Roberts, W. E.	*Surface Anatomy*	(10)	1937
Schaeffer, M., and Muckenfuss, R. S.	*Experimental Poliomyelitis* ..	(13)	1940
Semon, H. C. G., and Moritz, A.	*Atlas of Commoner Skin Diseases*.. 2nd Ed.		1940
Sex Hormones, The	.. .. 2nd Ed.	(8)	1940
Thomson, A., and Miles, A.	*Manual of Surgery* .. .. 9th Ed.		1939
Vallese, T.	*Un ignoto ricettario medico inglese del xiv. secolo*		1940
Wheeler, C. E.	*Introduction to the Principles and Practice of Homœopathy* .. .. 2nd Ed.	(3)	1940
Whitnall, S. E.	*Study of Anatomy* .. .. 4th Ed.	(10)	1939
Whittaker, C. R.	*Anatomy. Part III.* (*Head and Neck*). 5th Ed.		1940
Wilson, S. A. K.	*Neurology* .. .. 2 Vols.	(11)	1940

TRANSACTIONS, REPORTS, JOURNALS, ETC.

British Medical Association Handbook, 1931–2, 1933–4, 1936–7, 1937–8, 1938–9	(4)	
Brompton Hospital Reports, Vol. VIII.	(5)	1939
Medical Annual, 1940		1940
Quarterly Cumulative Index Medicus, Vol. 26, July—Dec., 1939		1940
St. Thomas's Hospital Reports, 2nd Series, Vol. IV.		1939
Transactions of the American Otological Society, Vol. XXIX.z..	(1)	1939

Publications Received

From Messrs Cassell & Co. Ltd.:

Manson's Tropical Diseases. Edited by Philip H. Manson-Bahr, C.M.G., D.S.O., M.A., M.D., D.T.M. and H. (Cantab.), F.R.C.P. (Lond.). Eleventh Edition. Price 35s.

From General Medical Council:

Second Addendum to the British Pharmacopoeia, 1932.

From Messrs. H. K. Lewis & Co. Ltd.:

Landmarks and Surface Markings of the Human Body. By L. Bathe-Rawling, M.B., B.Ch. (Cantab.), F.R.C.S., Eighth Edition. Price 8s. 6d.

Insect Pests. By William Clunie Harvey, M.D., D.P.H., M.R.San.I., and Harry Hill, M.R.San.I., A.M.I.S.E., M.S.I.A. Price 10s. 6d.

Tomography. By J. B. McDougall, M.D. (Glas.), F.R.C.P.Ed., F.R.S.E. Price 21s.

A Handbook of Radiography. By John A. Ross, M.A., M.R.C.S., L.R.C.P., D.M.R.E. Price 7s. 6d.

From Messrs. E. & S. Livingstone:

Illustrations of Bandaging and First Aid. Compiled by Lois Oakes, S.R.N., D.N. Price 6s.

Surgery of the Hand. By R. M. Handfield-Jones, M.C., M.S., F.R.C.S. Price 15s.

Anatomy. Part III. (*Head and Neck*). By Charles R. Whittaker, F.R.C.S.E., F.R.S.E. Fifth Edition. Price 1s. 6d.

Clinical Practice in Infectious Diseases. By E. H. R. Harries, M.D. (Lond.), M.R.C.P., D.P.H., and M. Mitman, M.D. (Lond.), M.R.C.P., D.P.H., D.M.R.E. Price 17s. 6d.

J. F. Sutherland's First Aid to Injured and Sick. Revised and rewritten by Halliday Sutherland, M.D. Forty-second Edition. Price 6d.

Advice to the Expectant Mother on the Care of her Health and that of her Child. By F. J. Browne, M.D., D.Sc., F.R.C.S.E., F.R.C.O.G. Fifth Edition. Price 6d.

From Oxford University Press:

Diseases of the Nervous System. By W. Russell Brain, M.A., D.M. (Oxon), F.R.C.P. (Lond.). Second Edition. Price 30s.

Cunningham's Manual of Practical Anatomy. Revised and edited by J. C. Brash and E. B. Jamieson. Tenth Edition. Three vols. Price 15s. each.

Groves and Brickdale's Text-book for Nurses. By E. W. Hey Groves, M.D., B.Sc., M.S., F.R.C.S., and J. A. Nixon, C.M.G., M.D., F.R.C.P. Sixth Edition. Price 21s.

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Local Medical Notes

Captain Percy K. Jenkins, Royal Army Medical Corps, has been awarded the Military Cross for gallant conduct with the B.E.F. during their evacuation from France.—*Western Daily Press.*

Royal College of Physicians of Edinburgh.—R. F. Barbour, M.A., M.B., Ch.B., has been admitted to the Fellowship.

EXAMINATION RESULTS.

University of Bristol.—Students of the University have recently passed the following examinations:—

M.B., CH.B.—*First Examination. Pass:* Grace V. Andrew, Elizabeth Bryant, Margaret J. Cox, R. W. Drewer, J. G. R. Ellis, Irene D. R. Gregory, D. H. Johnson, Margaret A. Lamb, Edith J. Lowick, D. Purnell, Dorothy M. Reece, Margaret E. J. Richards, A. D. Stewart, S. A. K. Stokes, T. Straton, W. B. Tindall, Pamela Westhead, Doris G. Virgo, Margaret M. Moncrieff, A. M. Sweeting, G. A. K. Jahans, R. A. J. Pearce.

M.B., CH.B.—*Second Examination. Pass:* Janet Baker, J. E. Beviss, Margot J. Copland, A. G. M. Davies, Mercia J. Griffiths, C. H. Gurd, Beryl M. Hinckley, J. E. G. Hope-Scott, D. E. Oliff, A. P. Radford (*a*), D. A. Sarsfield (*a*), Margaret Savile, S. S. Short (*a*, *b*), T. R. Stevens, Elizabeth N. R. Wilson. *In Group II Completing Examination:* Eileen M. Herbert, (Mrs.) Moragh Noakes, A. J. Saxton, Isabel M. M. Wilson. *In Group I only:* M. P. Bourke, J. Eskell, J. R. V. B. Gibson, W. H. N. Scawin.

M.B., CH.B.—*Final Examination* (*Section I*). *Pass:* G. T. Cribb, Winifred M. Curgenven-Robinson, Clara J. Fraser, G. H. Harvey (*c*), P. W. J. Searle.

(*a*) With Distinction in Anatomy.

(*b*) With Distinction in Physiology.

(*c*) With Distinction in Materia Medica, Pharmacy, Pharmacology, Pharmacotherapeutics and Toxicology.

M.B., CH.B. — *Final Examination. Pass (with Second Class Honours):* T. J. Butler (*d*), D. L. Bayle,y R. G. Boyd (*d*), P. Jacobs, Marjorie Organ, R. W. Orton, Patricia M. Simpson, J. J. de S. Snijman, Barbara F. Thomas (*e*), Joan Threadgold (*f*), G. H. Tovey (*f*), D. N. Walder, L. Willoughby, Winifred M. Curgenven-Robinson, Clara J. Fraser, J. K. Lewis, J. B. Tucker, G. H. Harvey, J. W. J. Newton, D. A. Squire.

B.D.S.—*First Examination.* Pass: H. L. Leech, Evelyn M. Pitt, I. A. Morgan.

B.D.S. — *Second Examination. Pass:* C. R. W. Birkett, Jean A. M. C. Gordon-Ralph, R. D. Hepburn.

B.D.S.—*Third Examination. Pass:* F. M. Warren (*g*), F. G. Lloyd.

L.D.S.—*First Examination. Pass:* R. D. Heald, J. J. Tittle, Eileen Rich.

L.D.S.—*Second Examination. Pass:* W. D. Arnold, W. E. C. Chaplin, H. B. Doubt, D. A. Holmes, J. Hornsby, R. E. May, B. A. Oliver, R. H. Shipway, J. B. Westlake, F. E. R. Williams, J. B. Wood.

L.D.S.—*Third Examination. Pass in Dental Mechanics and in Dental Anatomy:* G. G. Davis. *In Dental Mechanics:* G. Hellings. *In Dental Anatomy:* Patricia M. Burke, Isabella Rees.

L.D.S.—*Final Examination. Pass:* R. J. Lee, D. G. Davies, J. R. Herbert, P. Le Masurier, O. H. Minton, C. R. Sage, R. B. Stiles.

(*d*) With Distinction in Forensic Medicine and Toxicology.

(*e*) With Distinction in Surgery.

(*f*) With Distinction in Public Health.

(*g*) With Distinction in Dental Anatomy and Dental Mechanics and the Properties of Materials used in Dental Practice.

Conjoint Board.

L.R.C.P., M.R.C.S.—*First Examination. Pass:* B. L. Finzel (Anatomy).

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(*h*) Medicine. (*j*) Surgery. (*k*) Midwifery. (*l*) Pathology. * Qualified.

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